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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,611	10/06/2003	Tapesh Yadav	037768-0137	3294

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EXAMINER	
CHRISTIE, ROSS J	

ART UNIT	PAPER NUMBER
1731	

MAIL DATE	DELIVERY MODE
12/20/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/679,611	YADAV ET AL.	
	Examiner	Art Unit	
	ROSS J. CHRISTIE	1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *17-41* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *17-41* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Prosecution History

Examiner acknowledges receipt and entry of Applicants' Response to Office Action filed September 22, 2011 (hereinafter "Response").

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

   1. Determining the scope and contents of the prior art.
   2. Ascertaining the differences between the prior art and the claims at issue.
   3. Resolving the level of ordinary skill in the pertinent art.
   4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 32, 33 and 38-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 4,944,985 to Alexander (hereinafter "Alexander").

Referring to Applicants' claim 32, Alexander teaches a screen printable formulation (See Abstract; col. 13, ll. 41-47) comprising: a matrix comprising a polymer material (col.17, l. 38 – col. 18, l. 51; Example 1; the cation exchange resin is equivalent to Applicants’ claim term “a polymer material”); and nanofillers with domain size less than 250 nanometers (col. 12, l. 10 – col. 13, l. 62), the nanofillers consisting of copper (col. 13, ll. 41-47; in conductive paints, pastes or inks, Alexander teaches it is preferable to have a core of one metal, e.g., copper or silver, coated with another corrosion resistant metal, e.g., gold; and, Alexander contemplates employing particles (See claim 11) and coatings of metals such as copper, silver, gold, lead, tin, molybdenum, nickel, cobalt, indium, ruthenium, rhodium, palladium, osmium and platinum); wherein the nanofillers are coated with a layer of material that is compatible with the matrix, the coating comprising a material selected from the group consisting of a polymer and a monomer (col.17, l. 38 – col. 18, l. 51; Example 1).

At the time the invention was made a person having ordinary skill in the art would recognize combining the ultrafine particles with the cation exchange resin necessarily coats the ultrafine particles such that said ultrafine particles easily disperse within the screen printable formulation composition taught by Alexander. It would be obvious to a

person having ordinary skill in the art to coat the ultrafine particles of Alexander with the cation exchange resin prior to adding the ultrafine particles to said resin in order to enhance the compatibility of the ultrafine particles with said resin and further improve the dispersibility of the ultrafine particles in the resultant screen printable formulation taught therein.

Referring to Applicants' claim 33, Alexander teaches a screen printable formulation (See Abstract; col. 13, ll. 41-47) comprising: a matrix comprising polymer material (col. 17, l. 38 – col. 18, l. 51; Example 1; the cation exchange resin is equivalent to Applicants' claim term "a polymer material"); and nanofillers with domain size less than 100 nanometers (col. 12, l. 10 - col. 13, l. 62), the nanofillers selected from the group consisting of *copper nanofillers, silver nanofillers, gold nanofillers, palladium nanofillers, platinum nanofillers, and combinations thereof* (col. 12, l. 10 – col. 13, l. 62; in conductive paints, pastes or inks, Alexander teaches it is preferable to have a core of one metal, e.g., copper or silver, coated with another corrosion resistant metal, e.g., gold; and, Alexander contemplates employing particles (See claim 11) and coatings of metals such as copper, silver, gold, lead, tin, molybdenum, nickel, cobalt, indium, ruthenium, rhodium, palladium, osmium and platinum); wherein the nanofillers are coated with a layer of material that is compatible with the matrix, the coating comprising a material selected from the group consisting of a polymer and a monomer (col.17, l. 38 – col. 18, l. 51; Example 1).

At the time the invention was made a person having ordinary skill in the art would recognize combining the ultrafine particles with the cation exchange resin necessarily coats the ultrafine particles such that said ultrafine particles easily disperse within the screen printable formulation composition taught by Alexander. It would be obvious to a person having ordinary skill in the art to coat the ultrafine particles of Alexander with the cation exchange resin prior to adding the ultrafine particles to said resin in order to enhance the compatibility of the ultrafine particles with said resin and further improve the dispersibility of the ultrafine particles in the resultant screen printable formulation taught therein.

Referring to Applicants' claims 38-41, Alexander also teaches that the ultra-fine particles may be used to manufacture products such as conductive paints, pastes or inks (column 13, lines 41-47).

However, Alexander does not teach explicitly the formation of a print using these products per applicant claims 39 and 41 (col. 13, ll. 41-47).

Nonetheless, it is known in the printing arts that inks, for example, are suitable in the formation of printed matter and one skilled in the art would have utilized the ink product of Alexander, by known printing methods and with no change to their respective functions and/or operations, thus yielding the predictable result of a printed article.

5. Claims 17-31 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent No. 5,059,245 to Phillips (hereinafter "Phillips") in view of United States Patent No. 4,944,985 to Alexander (hereinafter "Alexander").

In accordance with MPEP 2111, Examiner has given the claim term “nanowhisker” its broadest reasonable interpretation to mean “any elongated particle (e.g., a particle having an aspect ratio greater than one, and preferably at least two)” according to page 11, paragraph [0037] of Applicants’ specification as originally filed.

Referring to Applicants' claim 17, Phillips teaches a screen printable formulation (See Abstract; optically variable ink of Phillips is equivalent to Applicants’ claim term “a screen printable formulation”) comprising a matrix comprising a polymer material (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips). Phillips teaches the optical thin film metallic flakes taught therein are coated with a layer of material that is compatible with the matrix (col. 13, ll. 31-50; col. 14, ll. 53-55; Phillips teaches removing the residual solution, e.g., PVA resin, from the metallic fillers need not be performed if the residual solution on the flakes is not detrimental to performance of the final product), the coating comprising a material selected from the group consisting of a polymer and a monomer (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips).

Although Phillips teaches employing optical thin film metallic flakes having a size of 2 to 5 microns (col. 14, ll. 20-36 of Phillips), even sub-micron sizes (col. 14, ll. 25-29; col. 15, ll. 23-34; the micron and sub-micron sized metallic flakes help provide improved

dispersion in a paint vehicle), and an aspect ratio greater than one (col. 14, ll. 37-45 of Phillips), Phillips does not teach explicitly the metallic fillers with domain size less than 100 nanometers and an aspect ratio greater than one.

However, Alexander teaches a screen printable formulation, that is, an ink, containing a polymer and nano-sized metallic fillers having a domain size less than 100 nanometers and an aspect ratio greater than one (col. 12, l. 10 - col. 13, l. 62 of Alexander).

Phillips contemplates sub-micron size metallic flakes, e.g., 0.65 microns, made by air impact pulverization can be utilized in the optically variable ink taught therein; however, Phillips discloses care must be taken so that the grinding will not destroy the color characteristics of the flakes. Alexander solves this technical obstacle such that the sub-micron and even nano-sized metallic flakes for use in inks as taught by Alexander can be employed in the optically variable ink taught by Phillips. And, both Philips and Alexander recognize the size of the metallic flakes help provide improved dispersion in a paint, paste, ink, etc. vehicle.

“A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.” *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). **MPEP 2144.05 [R-5] II. B.**

At the time the invention was made a person having ordinary skill in the art would recognize and appreciate the suitability of the nano-sized metallic fillers taught by

Alexander can be substituted for the sub-micron sized metallic flakes taught by Phillips. As Alexander teaches the nano-sized metallic fillers can be platelike shaped particles much like the sub-micron sized metallic flakes of Phillips, a person having ordinary skill in the art at the time the invention was made would appreciate the substitution would not alter the resultant optically variable ink of Phillips taught therein and likely achieve with a reasonable expectation of success the optically variable ink.

Referring to Applicants' claim 18, Phillips as modified by Alexander teaches employing optical thin film metallic flakes having a size of 2 to 5 microns (col. 14, ll. 20-36 of Phillips), even sub-micron sizes (col. 14, ll. 25-29; col. 15, ll. 23-34; the micron and sub-micron sized metallic flakes help provide improved dispersion in a paint vehicle), and an aspect ratio greater than one (col. 14, ll. 37-45 of Phillips), which encompasses Applicants' definition of the claim term "nanowhiskers".

Referring to Applicants' claim 19, Phillips as modified by Alexander teaches the fillers are fibers (col. 13, ll. 36-40 of Alexander).

Referring to Applicants' claim 20, Phillips as modified by Alexander teaches the fillers are platelike (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips; col. 13, ll. 36-40 of Alexander).

<u>Referring to Applicants' claim 21</u>, Phillips as modified by Alexander teaches the screen printable formulation is an ink (col. 14, ll. 53-55 of Phillips; col. 13, l. 41-47; col. 15, l. 62 – col. 16, l. 16 of Alexander).

<u>Referring to Applicants' claim 22</u>, Phillips as modified by Alexander teaches the screen printable formulation is a paste (col. 13, ll. 41-47 of Alexander).

<u>Referring to Applicants' claim 23</u>, Phillips as modified by Alexander teaches the fillers comprise an element selected from the group consisting of aluminum, barium, bismuth, cadmium, calcium, cerium, cesium, *cobalt*, *copper*, europium, gallium, *indium*, iron, lanthanum, lithium, magnesium, manganese, *molybdenum*, neodymium, *nickel*, niobium, potassium, praseodymium, scandium, sodium, strontium, tantalum, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium (col. 12, l. 10 – col. 13, l. 62; in conductive paints, pastes or inks, Alexander teaches it is preferable to have a core of one metal, e.g., copper or silver, coated with another corrosion resistant metal, e.g., gold; and, Alexander contemplates employing particles (See claim 11) and coatings of metals such as copper, silver, gold, lead, tin, molybdenum, nickel, cobalt, indium, ruthenium, rhodium, palladium, osmium and platinum).

<u>Referring to Applicants' claim 24</u>, Phillips teaches a screen printable formulation (See Abstract; optically variable ink of Phillips is equivalent to Applicants' claim term "a screen printable formulation") (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips). Phillips

teaches the optical thin film metallic flakes taught therein are coated with a layer of material that is compatible with the matrix (col. 13, ll. 31-50; col. 14, ll. 53-55; Phillips teaches removing the residual solution, e.g., PVA resin, from the metallic fillers need not be performed if the residual solution on the flakes is not detrimental to performance of the final product), the coating comprising a material selected from the group consisting of a polymer and a monomer (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips).

Although Phillips teaches employing optical thin film metallic flakes having a size of 2 to 5 microns (col. 14, ll. 20-36 of Phillips), even sub-micron sizes (col. 14, ll. 25-29; col. 15, ll. 23-34; the micron and sub-micron sized metallic flakes help provide improved dispersion in a paint vehicle), and an aspect ratio greater than one (col. 14, ll. 37-45 of Phillips), Phillips does not teach explicitly the ceramic nanofillers with domain size less than 100 nanometers and an aspect ratio greater than one.

However, Alexander teaches a screen printable formulation, that is, an ink, containing a polymer and nano-sized metallic and/or ceramic fillers having a domain size less than 100 nanometers and an aspect ratio greater than one (col. 1, ll. 16-17; col. 6, ll. 21-40; col. 12, l. 10 - col. 13, l. 62 of Alexander).

Phillips contemplates sub-micron size metallic flakes, e.g., 0.65 microns, made by air impact pulverization can be utilized in the optically variable ink taught therein; however, Phillips discloses care must be taken so that the grinding will not destroy the color characteristics of the flakes. Alexander solves this technical obstacle such that the sub-micron and even nano-sized metallic flakes for use in inks as taught by Alexander can be employed in the optically variable ink taught by Phillips. And, both

Philips and Alexander recognize the size of the metallic flakes help provide improved dispersion in a paint, paste, ink, etc. vehicle.

"A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). **MPEP 2144.05 [R-5] II. B.**

At the time the invention was made a person having ordinary skill in the art would recognize and appreciate the suitability of the nano-sized metallic fillers taught by Alexander can be substituted for the sub-micron sized metallic flakes taught by Phillips. As Alexander teaches the nano-sized metallic fillers can be platelike shaped particles much like the sub-micron sized metallic flakes of Phillips, a person having ordinary skill in the art at the time the invention was made would appreciate the substitution would not alter the resultant optically variable ink of Phillips taught therein and likely achieve with a reasonable expectation of success the optically variable ink.

<u>Referring to Applicants' claim 25</u>, Phillips as modified by Alexander teaches employing optical thin film metallic flakes having a size of 2 to 5 microns (col. 14, ll. 20-36 of Phillips), even sub-micron sizes (col. 14, ll. 25-29; col. 15, ll. 23-34; the micron and sub-micron sized metallic flakes help provide improved dispersion in a paint vehicle), and an aspect ratio greater than one (col. 14, ll. 37-45 of Phillips), which encompasses Applicants' definition of the claim term "nanowhiskers".

<u>Referring to Applicants' claim 26</u>, Phillips as modified by Alexander teaches the fillers are fibers (col. 13, ll. 36-40 of Alexander).

<u>Referring to Applicants' claim 27</u>, Phillips as modified by Alexander teaches the fillers are platelike (col. 13, ll. 31-50; col. 14, ll. 53-55 of Phillips; col. 13, ll. 36-40 of Alexander).

<u>Referring to Applicants' claim 28</u>, Phillips as modified by Alexander teaches the screen printable formulation is an ink (col. 14, ll. 53-55 of Phillips; col. 13, l. 41-47; col. 15, l. 62 – col. 16, l. 16 of Alexander).

<u>Referring to Applicants' claim 29</u>, Phillips as modified by Alexander teaches the screen printable formulation is a paste (col. 13, ll. 41-47 of Alexander).

<u>Referring to Applicants' claim 30</u>, Phillips as modified by Alexander teaches the fillers comprise an element selected from the group consisting of aluminum, barium, bismuth, cadmium, calcium, cerium, cesium, *cobalt*, *copper*, europium, gallium, *indium*, iron, lanthanum, lithium, magnesium, manganese, *molybdenum*, neodymium, *nickel*, niobium, potassium, praseodymium, scandium, sodium, strontium, tantalum, tin, titanium, tungsten, vanadium, ytterbium, yttrium, zinc, and zirconium (col. 12, l. 10 – col. 13, l. 62; in conductive paints, pastes or inks, Alexander teaches it is preferable to have

a core of one metal, e.g., copper or silver, coated with another corrosion resistant metal, e.g., gold; and, Alexander contemplates employing particles (See claim 11) and coatings of metals such as copper, silver, gold, lead, tin, molybdenum, nickel, cobalt, indium, ruthenium, rhodium, palladium, osmium and platinum).

Referring to Applicants' claims 31, Phillips as modified by Alexander teaches the filler comprises at least one element from the group consisting of aluminum, antimony, boron, carbon, germanium, indium, *nickel*, nitrogen, oxygen, phosphorus, selenium, silicon, sulfur, or tellurium (col. 12, l. 10 – col. 13, l. 62; in conductive paints, pastes or inks, Alexander teaches it is preferable to have a core of one metal, e.g., copper or silver, coated with another corrosion resistant metal, e.g., gold; and, Alexander contemplates employing particles (See claim 11) and coatings of metals such as copper, silver, gold, lead, tin, molybdenum, nickel, cobalt, indium, ruthenium, rhodium, palladium, osmium and platinum).

Referring to Applicants' claim 34, Phillips as modified by Alexander teaches a product manufactured using the printable formulation of claim 17 (col. 15, ll. 23-35 of Philips; col. 13, ll. 41-47 of Alexander).

Referring to Applicants' claim 35, Phillips as modified by Alexander teaches a print manufactured using the printable formulation of claim 17 (col. 15, ll. 36-49 of Phillips).

Referring to Applicants' claim 36, Phillips as modified by Alexander teaches a product manufactured using the printable formulation of claim 24 (col. 15, ll. 23-35 of Philips; col. 13, ll. 41-47 of Alexander).

Referring to Applicants' claim 37, Phillips as modified by Alexander teaches a print manufactured using the printable formulation of claim 24 (col. 15, ll. 36-49 of Phillips).

Response to Arguments

6. Applicants' arguments, see Response, filed September 22, 2011, with respect to the rejection of claims 17-41 under 35 USC 103(a) over Feilchenfeld in view of Alexander and Damm have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made in view of United States Patent No. 5,059,245 to Phillips (hereinafter "Phillips").

7. Applicants assert the Damm teaches a polymer-coated metal particle in which the polymer coating acts as an insulating layer thus neutralizing the charge exhibited by the metal particle. Applicants assert further a person having ordinary skill in the art would not have modified the teachings of Feilchenfeld using Damm. Feilchenfeld teaches an electrically conductive polymer paste containing metallic particles, that is, isotropically conductive joining material. Applicants assert these metallic particles of

Feilchenfeld would no longer be “isotropically conductive” if the metallic particles were coating with an insulating layer according to Dammn’s teachings. Examiner agrees and has withdrawn the aforementioned rejection.

8. Applicants’ arguments with respect to the rejection of claims 32, 33 and 38-41 filed September 22, 2011 have been fully considered but they are not persuasive.

9. Applicants assert Alexander teaches core-and-shell type composite particles, which are different than Applicants’ claim term "nanofillers”. Examiner agrees Alexander teaches an embodiment that can be described, using Applicants’ terminology, as core-and-shell type composite particles. However, Alexander teaches several embodiments including composites powders having a core of one metal coated with another corrosion resistant metal to achieve good properties. Hence, Alexander teaches Applicants’ claim term “nanofillers" according to Applicants' claims 32, 33 and 38-41.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROSS J. CHRISTIE whose telephone number is (571)270-3478. The examiner can normally be reached on Monday-Friday 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Jerry Lorengo can be reached on (571) 272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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